Remarks

Currently, claims 19, 21-26, and 47 are pending in this application. Claims 19, 24-26, and 47 have been amended. No new matter has been entered.

The examiner rejected claims 24-26, and 47 under 35 USC 112, second paragraph, as being indefinite. Independent claim 19, and dependent claims 24-26 are rejected under 35 USC 102(b) as being anticipated by Hashimoto et al (US 6,077,596) and also Mehrotra et al (US 4,880,755). Independent claim 19 and dependent claims 21-24 are rejected under 35 U.S.C. § 103(a) as being obvious in light of Sarin et al (US 4,702,970 or US 4,701,384). Claims 19 and 24-26 are rejected under 35 USC 103(a) as being obvious in light of Rechberger et al (US 5,965,253). Independent claim 47 is rejected under 103(a) as being obvious in light of Hashimoto et al or Mehrotra et al or Sarin et al or Rechberger et al.

Claim Rejections under 35 USC § 112

Claims 24-26, and 47 have been amended to overcome the rejection for indefiniteness under § 112.

Rejections of amended independent claim 19 and its dependents under 102(b) and 103

Amended independent claim 19 recites, *inter alia*, a coated machine tool with a multilayer wear resistant coating applied to a base material of the machine tool. The coating comprises a relatively hard underlayer having at least two layers, and a chemically inert rare earth oxide overlayer. The underlayer, which is formed over the base material of the machine tool, comprises a metal layer, and a layer comprising a metal nitride, a metal carbide, or a metal carbo-nitride formed over the metal layer. The rare earth oxide overlayer, which is formed over the underlayer, comprises a rare earth oxide that exhibits positive free energies of reaction with titanium. The rare earth oxide overlayer constitutes the outermost layer of the coated machine tool.

None of the references relied upon under §§ 102 and 103, (Hashimoto, Mehrotra, Sarin or Rechberger) teach or suggest a coated machine tool comprising, *inter alia*, a rare earth oxide overlayer that constitutes the outermost layer of the tool, as recited in amended claim 19.

Hashimoto teaches a coated hard tool with a hard base material and a hard coating formed on the surface of the base material. (col. 2, lines 14-33) The hard coating, which

constitutes the outer layer of the tool, has at least 4 and preferably 10 or more sublayers in total, wherein the sublayers comprises a plurality of alternating A or B type sublayers. The A sublayer comprises a series of secondary sublayers wherein each secondary sublayer contains nitrides, carbides, carbo-nitrides, or oxides of Al, B, or periodic group 4A and 5A elements. The B sublayer comprises a single layer composed of nitrides, carbides, carbo-nitrides, or oxides of Al, B, or periodic group 4A and 5A elements.

Hashimoto does not teach a rare earth oxide overlayer, wherein the overlayer constitutes the outermost layer as recited in independent claim 19. Hashimoto teaches oxides of Al, B, or 4A and 5A periodic group elements. Because none of these elements constitute rare earth elements, Hashimoto does not teach rare earth oxides used in the overlayer. Moreover, claim 19 recites and Hashimoto fails to teach a metal layer formed over the base material of the machine tool, as recited in amended claim 19. Hashimoto only teaches that nitrides, carbides, or carbo-nitrides, or oxides may be formed on the base material. Accordingly, Hashimoto does not teach all elements of claim 19, and thereby does not anticipate claim 19 and its dependent claims.

Mehrotra teaches a ceramic material with an alumina applied on the ceramic material, and a refractory coating applied on the alumina. The coating comprises carbides, nitrides, oxides, or carbo-nitrides of vanadium, titanium, tantalum, niobium, hafnium, or zirconium. Similar to Hashimoto, Mehrotra also does not teach a rare earth oxide overlayer, because vanadium, titanium, tantalum, niobium, hafnium, or zirconium do not constitute rare earth elements. Thus, Hashimoto and Mehrotra do not teach claim 19 and its dependent claims under 102(b).

Sarin teaches a wear resistant article with a cemented carbide substrate body, and a fully dense, adherent, wear resistant, composite ceramic coating having at least two phases on the substrate. (U.S No. 4,701,384, col. 1, lines 43-63). The coating comprises a continuous oxide layer with an oxide of aluminum, zirconium, or yttrium. *Id.* The coating also comprises an additional phase having an oxide of elements aluminum, zirconium, or yttrium; however, this oxide must comprise a different element than the other oxide present in the coating. *Id.* Referring to Figs. 1 and 2, Sarin discloses an outer layer comprised of titanium nitride.

Sarin also does not teach a rare earth oxide overlayer in its outermost layer. Sarin teaches a rare earth oxide, such as yttrium oxide, in an underlayer, and a titanium nitride in the outer layer of the Sarin wear-resistant article. Consequently, Sarin fails to teach rare earth oxides in the

outermost layer as recited in claim 19. Thus, the teachings of Sarin do not support a rejection a rejection under 103(a).

Rechberger discloses a tool coated with a pure surface coating in its outermost layer having oxides of Groups 5B and 6B (vanadium, niobium, tantalum, chromium, molybdenum, and tungsten) of the periodic table. Rechberger does not teach or suggest a rare earth oxide layer in its outermost layer, as recited in claim 19. Rechberger teaches oxides of Group 5B and 6B, which do not constitute rare earth elements; therefore, Rechberger does not teach a rare earth oxide. Because Rechberger fails to teach or suggest all elements of the claimed invention, the 103(a) rejection should be withdrawn Accordingly, the rejections of amended independent claim 19 and its dependent claims are respectfully traversed, and the claims are in condition for allowance.

Rejections of claim 47 under 103

Amended independent claim 47 recites, *inter alia*, a coated machine tool with a multilayer wear resistant coating applied to a base material of the machine tool. The coating comprises a relatively hard underlayer formed over the base material of the machine tool, an yttrium oxide overlayer, and an interlayer between the underlayer and the overlayer. The yttrium oxide overlayer, which constitutes the outermost layer, exhibits positive free energies of reaction with titanium. The interlayer comprises first and second components, wherein the first component comprises yttrium. The relative proportions of the first and second components of the interlayer are graded across the interlayer such that a quantity of the yttrium in the interlayer increases from a side of the interlayer adjacent to the underlayer to a side of the interlayer adjacent to the overlayer.

None of the cited references (Hashimoto, Mehrotra, Sarin or Rechberger), singularly or in combination, teach or suggest an yttrium oxide overlayer that constitutes the outermost layer of the coated machine tool, as recited in amended claim 47. As stated above, Hashimoto, Mehrotra contain no teachings of rare earth oxides, such as yttrium oxide. Sarin teaches an yttrium oxide underlayer, but does teach that yttrium oxide may be used in the outermost layer as recited in claim 47. As stated above, Sarin teaches a TiN outer layer. Accordingly, none of the references teach or suggest all the limitations of the claimed invention, thus claim 47 is in condition for allowance.

Serial No.: 10/034,852
Docket No.: UNI 0041 PA/40809.57

The Applicants respectfully submit that, in view of the above amendments, and remarks, the application is now in condition for allowance. The Examiner is encouraged to contact the undersigned to resolve efficiently any formal matters or to discuss any aspects of the application or of this response. Otherwise, early notification of allowable subject matter is respectfully requested.

Respectfully submitted,

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